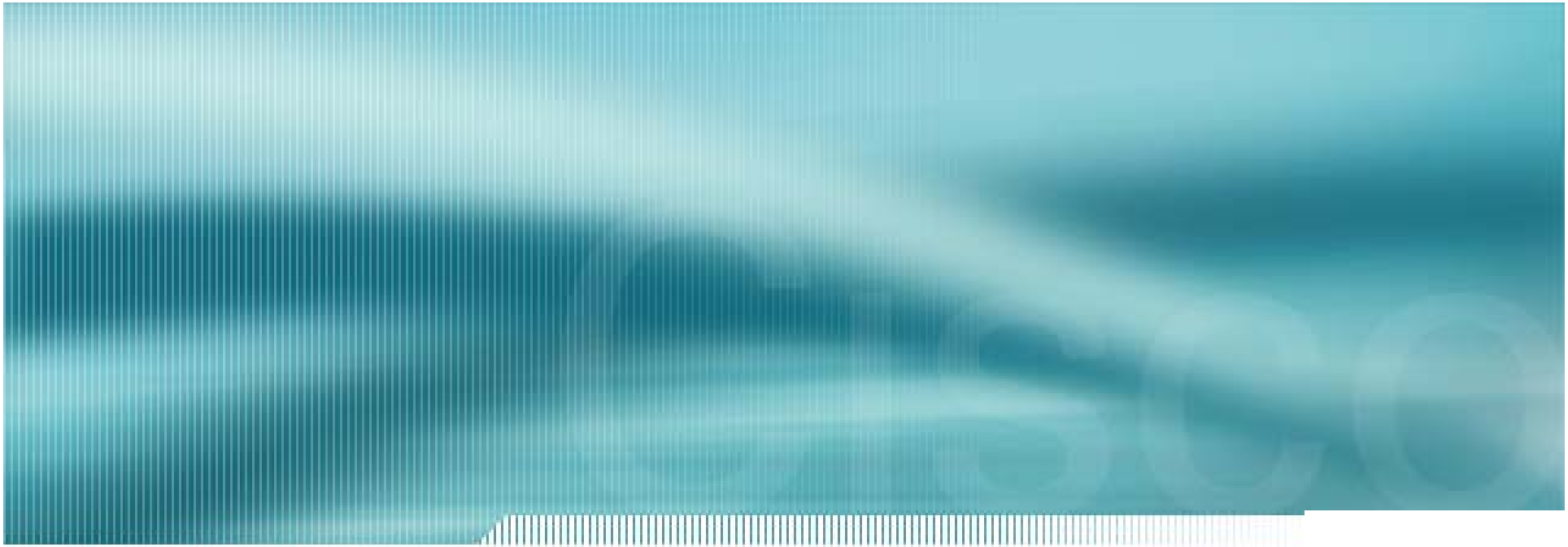


Stateful power management proposal

Hugh Barrass (Cisco Systems)

Requirements of stateful management

- State definitions
  - Should be small # of states
  - Power mode – consists of set of operating information
  - States define how to set or change power mode
- Robust state change mechanism
  - Need to control state changes…
  - … and be sure of partner's state
  - Needs data transfer protocol
  - Prefer defined and well-known protocol
- Should allow simplifications
  - Trade cost vs optimization

Communication protocol

- 802.3ah OAM
  - Slow protocol frames
    - Very small impact on data b/w
    - Not forwarded by bridges
  - Clause 57 definition
  - Can interrogate Clause 30 MIB objects
  - Also includes alarms
- Use a query-response mechanism…
  - Periodically interrogate partner's state
  - State change request and acknowledge
- … supplemented with alarms for sudden changes
  - Can speed emergency state transitions (e.g. dying gasp)

How to use .3ah OAM

- Normative references
  - Require support for OAM (maybe allow simple PD exception)
  - Define MIB objects to interrogate
  - Define timing & sequences for state communications
- Also include informative
  - Annex showing entire OAM frames for state interrogate and response
- Other consideration
  - Whether to allow operation using alternate state communication?
- States & communication mechanism first priority
  - Focus on states first – collect power mode objects later

Power mode objects (PSE & PD)

Some suggestions for discussion…

- Not necessary for state & communication definition

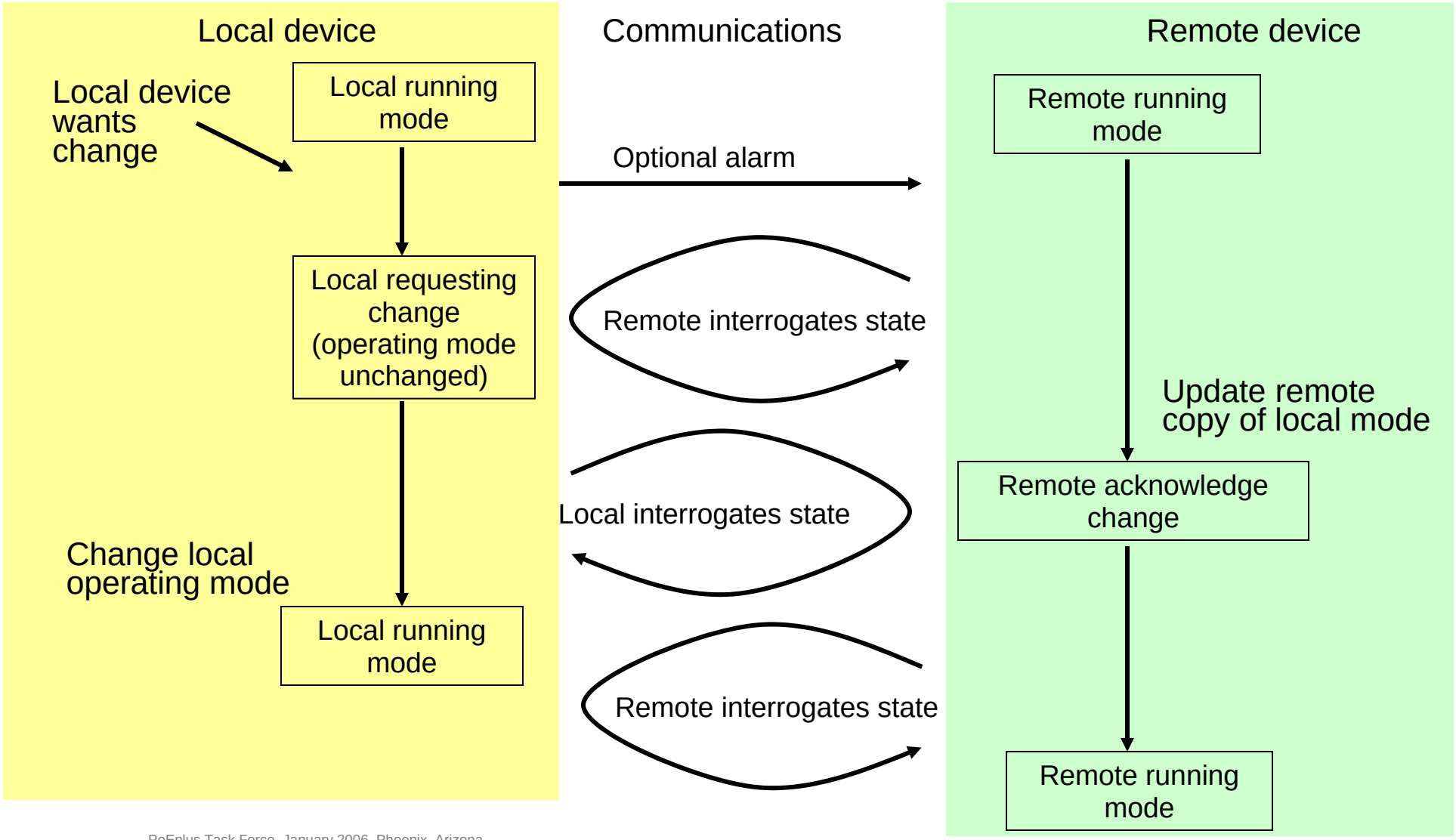
Power mode (actual and requested)

- actualPeakPower; actualAveragePower; remainingPowerMargin; requestedPeakPower; requestedAveragePower
- (average could be defined as 10 second moving average)
- Other objects TBD; e.g. support for statistical oversubscription

Plus, of course state definitions PSE & PD

- State: running; requestingNewMode; aknowledgeChange – maybe some others

General state change procedure



Detailed state behavior (1)

- Periodically interrogate remote state (constantly)
  - i.e. once per second send interrogate frame & process response
- If in running state and remote state changes to requesting state
  - Observe remote requestedPower objects
  - Change to acknowledge or non-acknowledge state
  - (depending on acceptance of change)
  - If acknowledge, change local copy of remote requestedPower objects
- If remote state changes to running
  - Change to running state

Detailed state behavior (2)

If in running state and local device wishes to change

- Interrogate remote device, confirm in running state
- Set local requestedPower objects
- Change to requesting state
- (optionally send alarm)

If remote state changes to acknowledge

- Change operating power mode; update local actualPower objects; change to running state

Else if remote state changes to non-acknowledge

- Do not change operating power mode; change to running state

Detailed state behavior (3)

Collision event

- In requesting state, remote changes to requesting state
- Do not change operating power mode; change to running state
- PSE

Initial state

- After power up, use L1 classification as first actualPower mode (both local and remote)

Loss of communication

- If no response for TBD interrogations assume dead partner
- Procedure TBD – to define explicitly for PSE & PD

Persist or vacillate

State definitions require that each request must be acknowledged or denied before returning to running state

- The requestor must not de-assert request until ack/non-ack
- The partner must respond to request as soon as it is seen

The requestor may persist or vacillate after non-ack

- Simply re-assert request - TBD delay before repeat request
- Not re-assert denied request or request reversal change

NB some offers cannot be refused!

- PSE might withdraw power if necessary

More stuff…

- Do we need a “deep sleep” mode
  - PD does not communicate, maybe link down
  - PSE allocates enough power to restart
- Graceful power withdrawal
  - PSE request change to 0 power
  - Allows PD to indicate controlled power-down
- Minimal PD behavior TBD (dumb PSE already defined)
  - No support for OAM = always stick in initial state
  - (Equivalent to .3af for lower power)
  - Only respond to OAM = request 1 operating mode & stick there
  - (no possibility of PSE requested change)

Next steps

Turn this into a complete normative definition

- Not feasible in PowerPoint

Write informative descriptions of frames

- Based on Clause 57

Make list & definitions for power mode objects

- actualPeakPower; actualAveragePower; remainingPowerMargin; requestedPeakPower; requestedAveragePower

Address TBDs

- Loss of communication (PSE & PD) behavior; deep sleep mode; simplified PD behavior; etc.

Questions…

… or comments